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(54) **SURGICAL ACCESS DEVICE INCLUDING ANCHOR WITH RACHET MECHANISM**

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See application file for complete search history.

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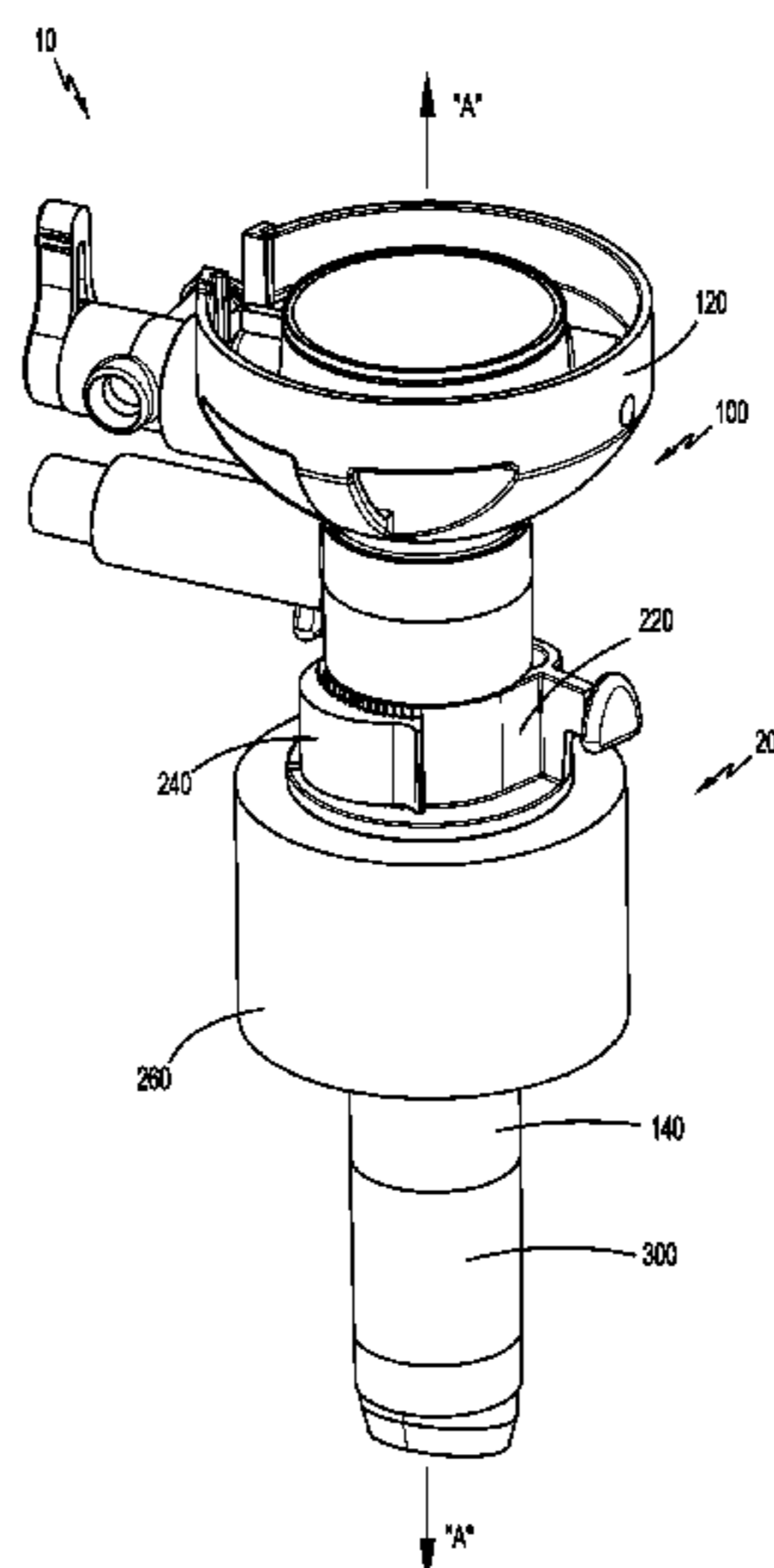
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**ABSTRACT**

A surgical access device includes a cannula body and an anchor. The cannula body includes a housing, and an elongated portion extending distally from the housing. The elongated portion defines a longitudinal axis and defines a channel extending therethrough. The anchor is disposed in mechanical cooperation with the elongated portion of the cannula body and is longitudinally translatable relative to the elongated portion. The anchor defines an aperture and includes a ratchet mechanism configured to selectively lock a size of the aperture.

**20 Claims, 7 Drawing Sheets**



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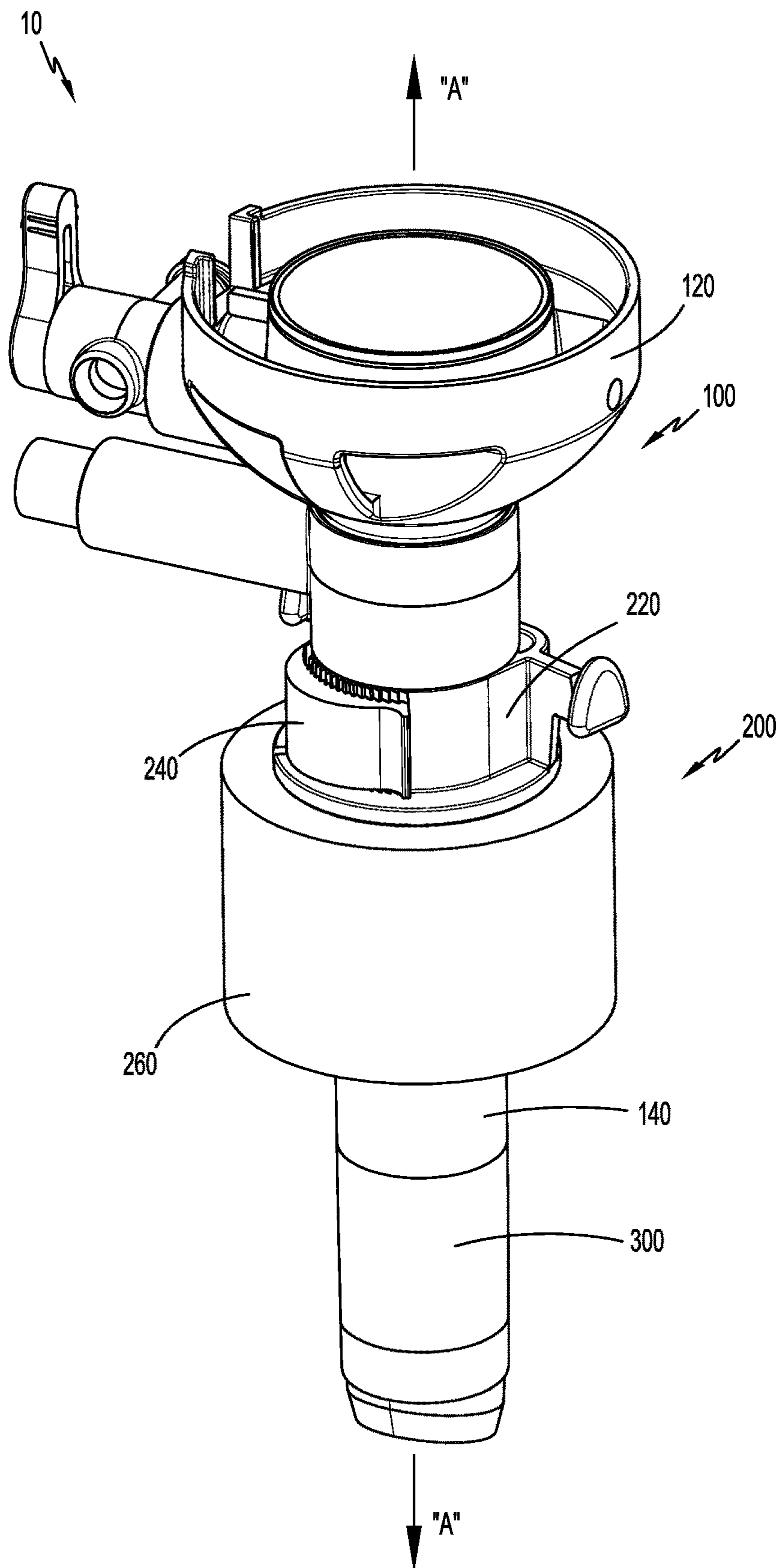
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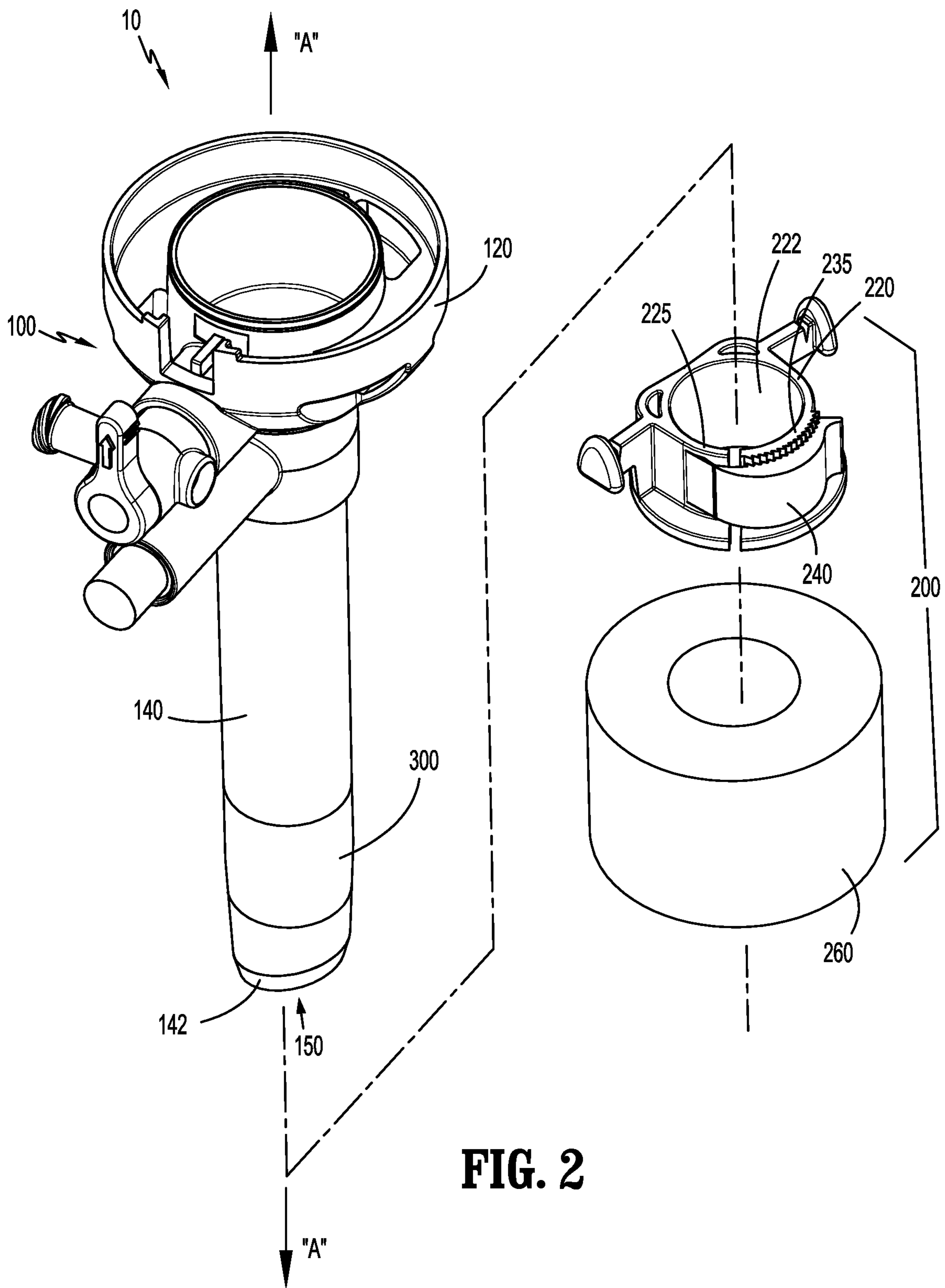
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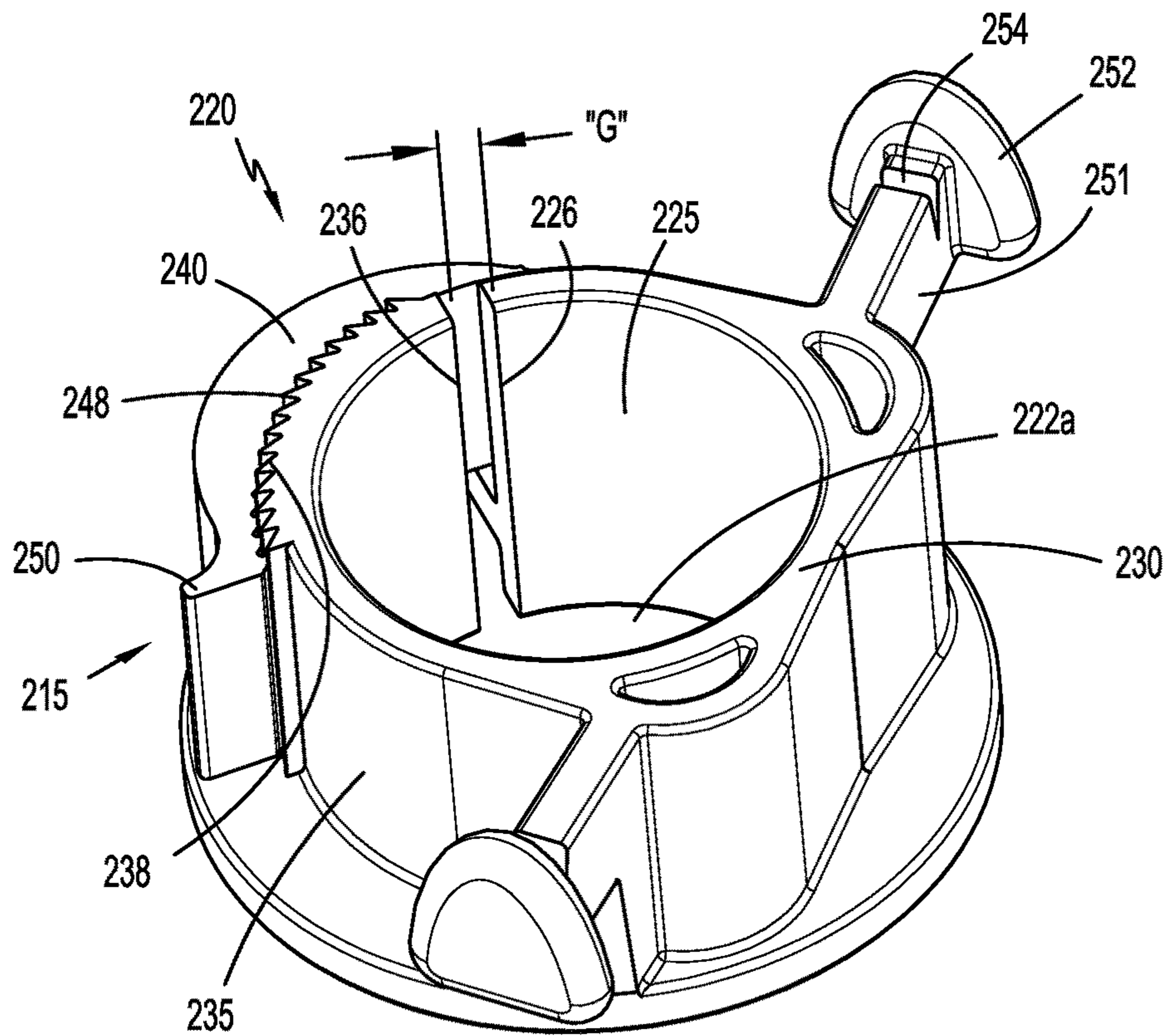
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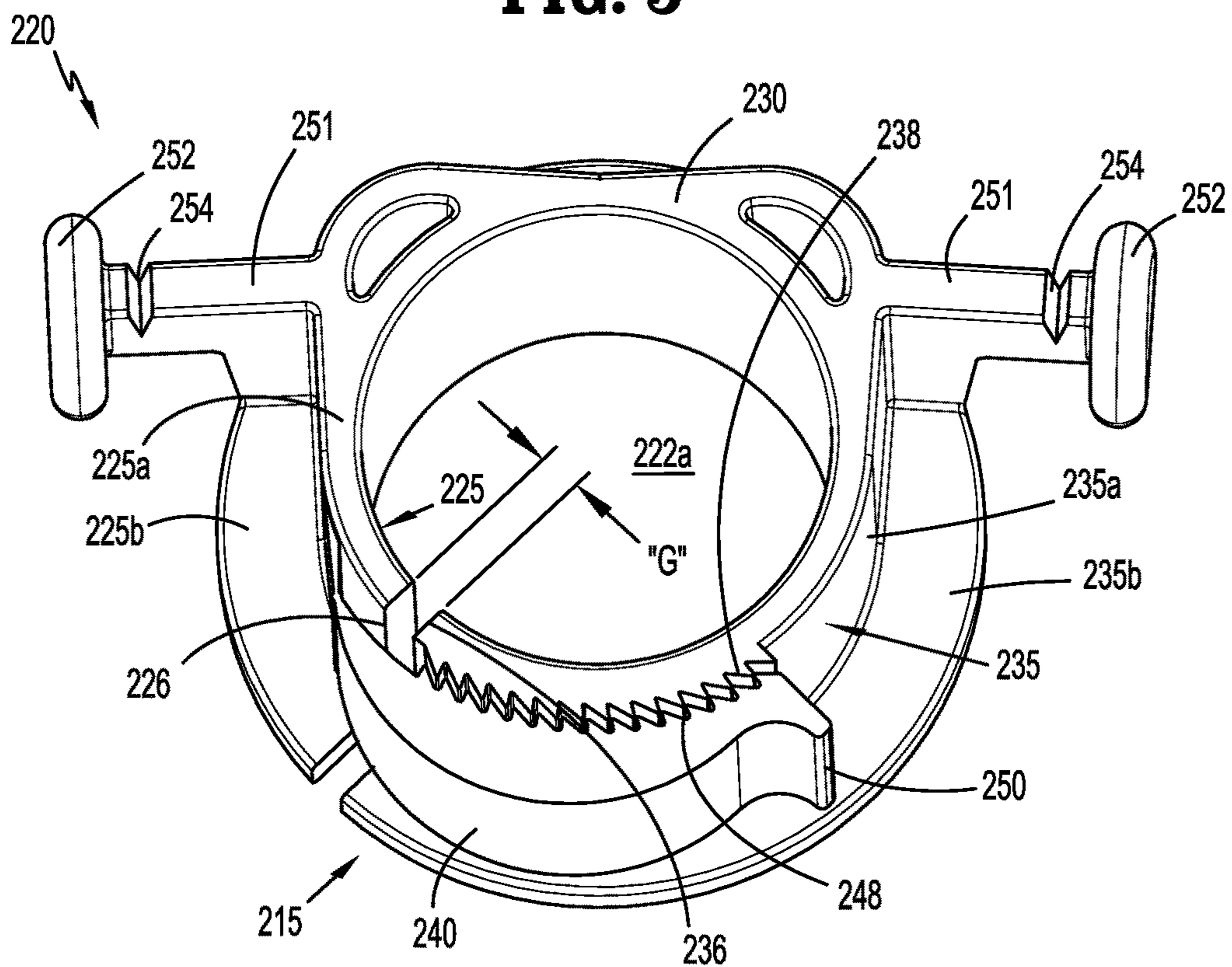
**FIG. 1**



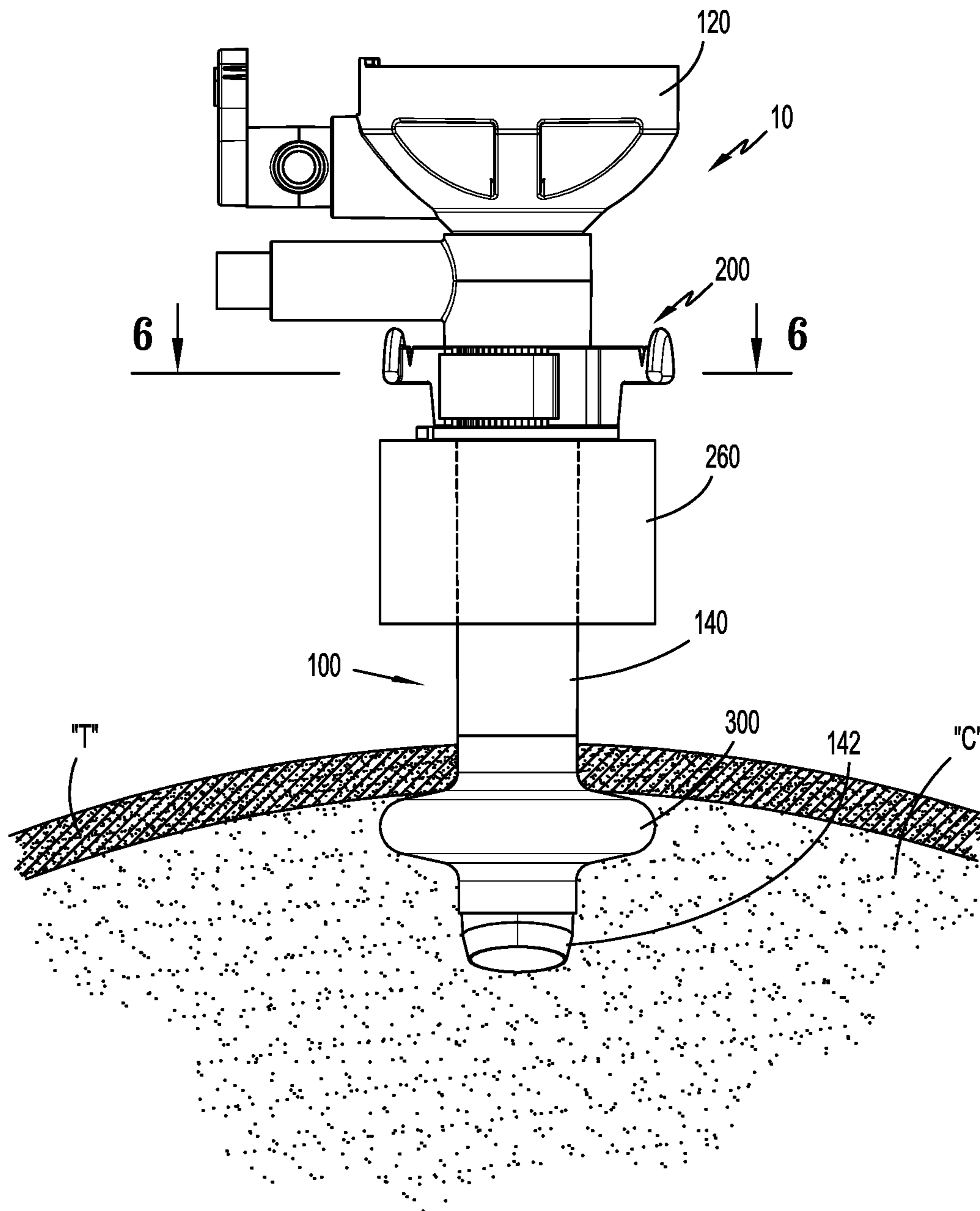
**FIG. 2**



**FIG. 3**



**FIG. 4**



**FIG. 5**

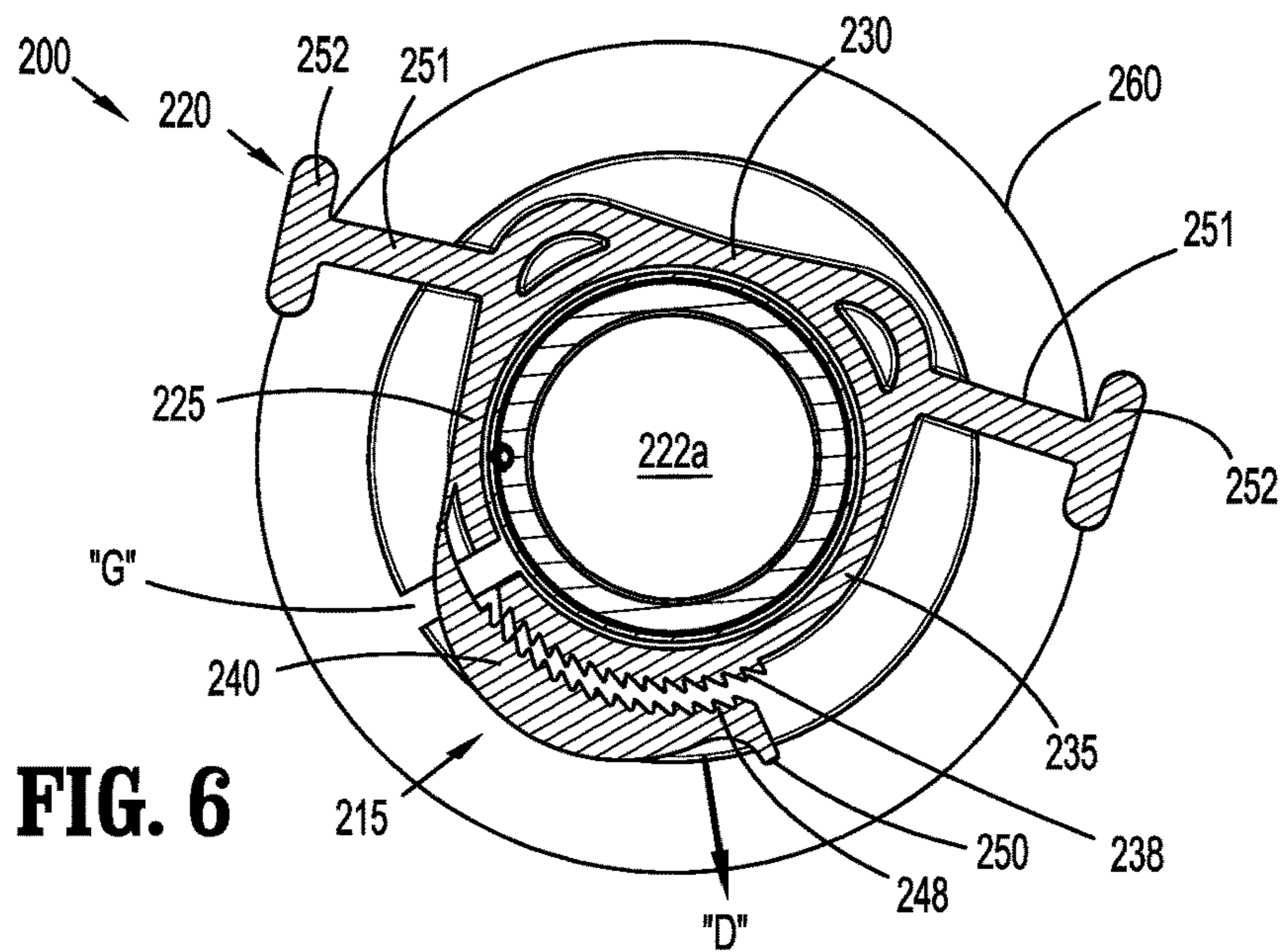


FIG. 6

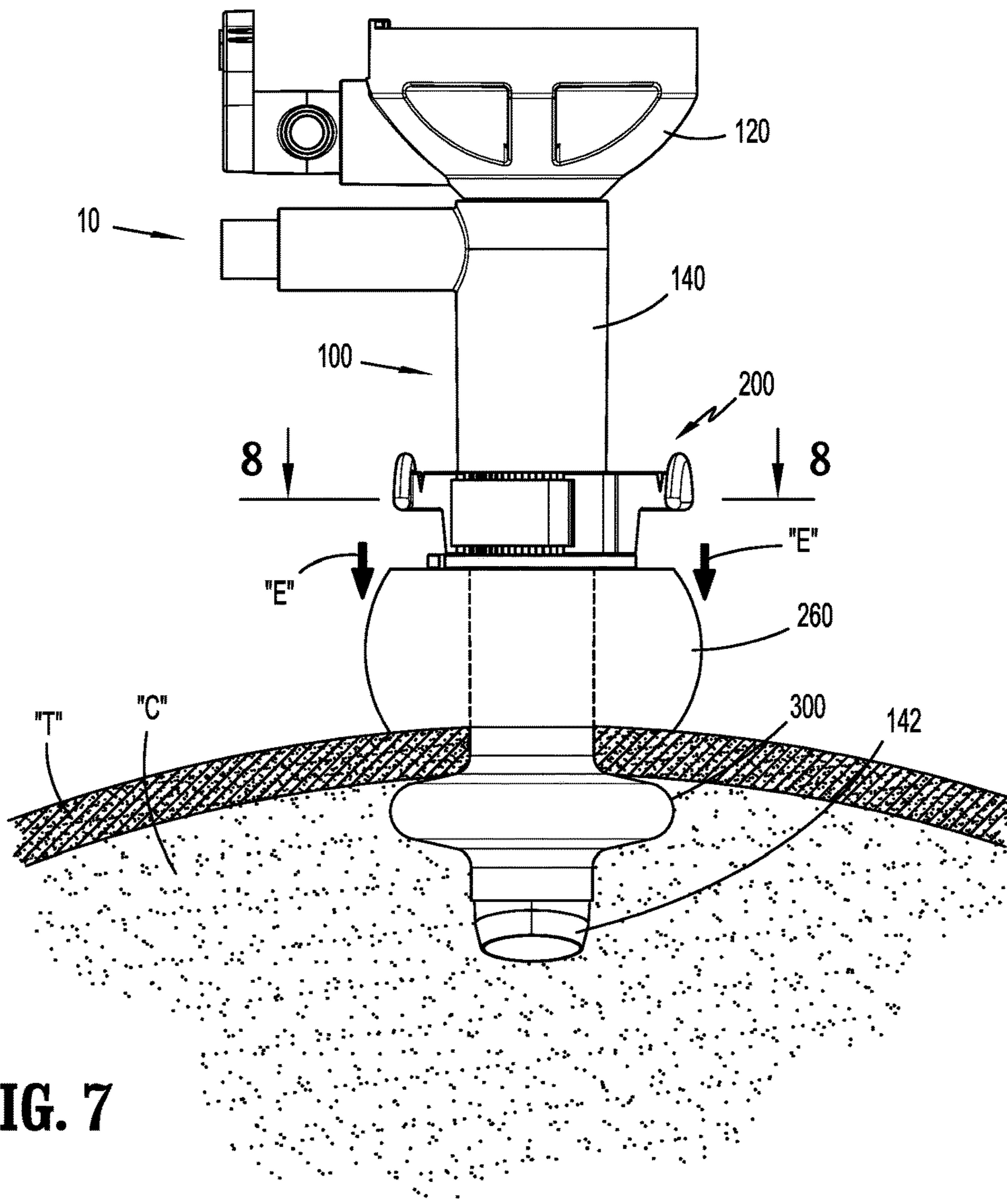
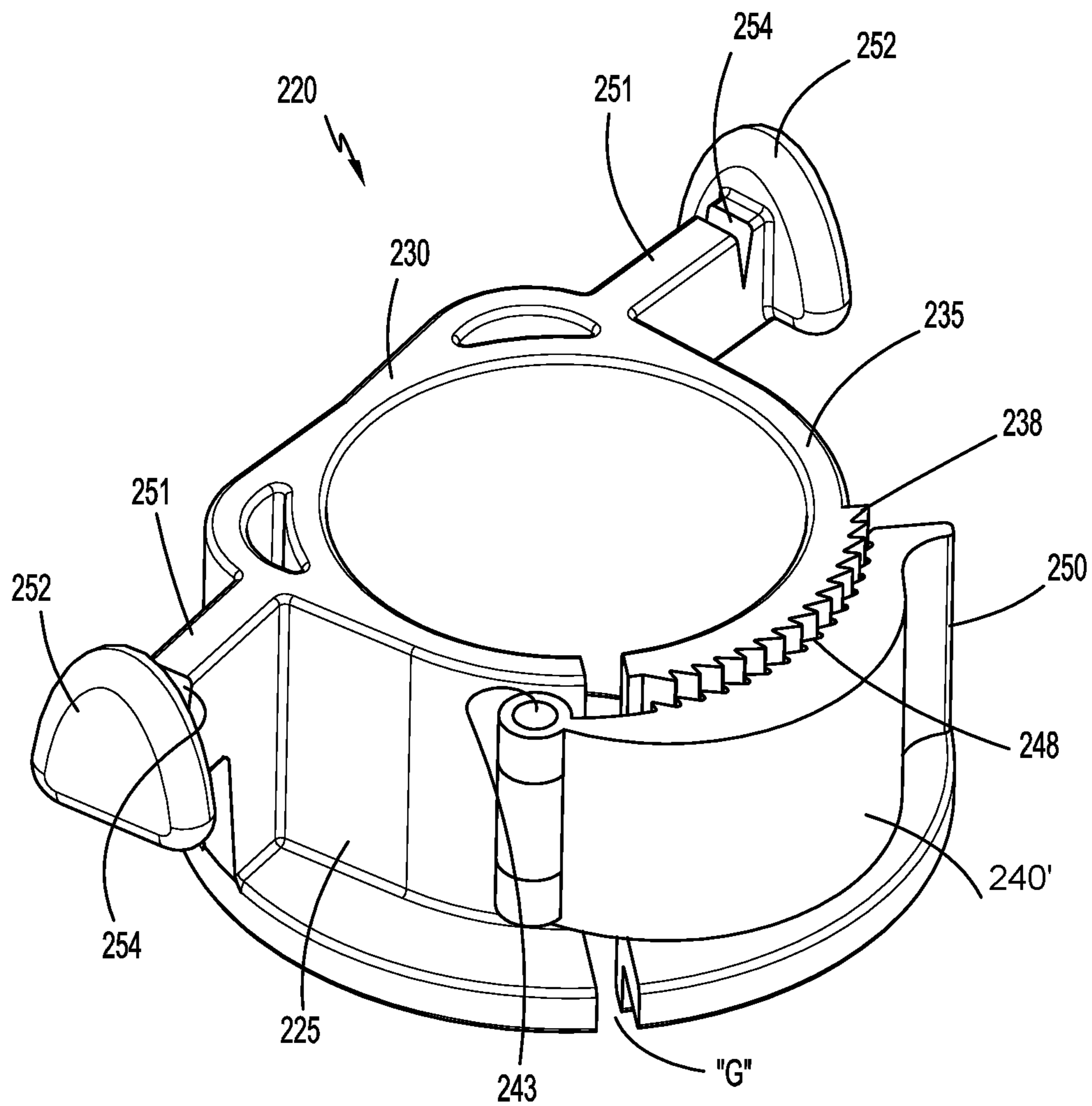


FIG. 7







**FIG. 10**

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## SURGICAL ACCESS DEVICE INCLUDING ANCHOR WITH RACHET MECHANISM

### BACKGROUND

#### Technical Field

The present disclosure relates to a surgical access device. More particularly, the present disclosure relates to a surgical access device including an anchor with a ratchet mechanism to help maintain its position relative to a patient during a surgical procedure.

#### Background of Related Art

In minimally invasive surgical procedures, including endoscopic and laparoscopic surgeries, a surgical access device permits the introduction of a variety of surgical instruments into a body cavity or opening. A surgical access device (e.g., a cannula) is introduced through an opening in tissue (i.e. a naturally occurring orifice or an incision) to provide access to an underlying surgical site in the body. The incision is typically made using an obturator having a blunt or sharp tip that has been inserted within the passageway of the surgical access device. For example, a cannula has a tube of rigid material with a thin wall construction, through which an obturator may be passed. The obturator is utilized to penetrate a body wall, such as an abdominal wall, or to introduce the surgical access device through the body wall, and is then removed to permit introduction of surgical instrumentation through the surgical access device to perform the surgical procedure.

During these procedures, it may be challenging to maintain the position of the surgical access device with respect to the body wall, particularly when exposed to a pressurized environment. To help maintain the position of the surgical access device with respect to the body wall, an anchor positioned near a distal end of the surgical access device and adjacent tissue is occasionally used. Positioning and securing such an anchor while the surgical access device is within the body helps minimize undesired movement of the surgical access device with respect to the body.

Accordingly, it may be helpful to provide an anchor with a ratchet mechanism to help maintain the longitudinal position of the surgical access device with respect to the patient.

### SUMMARY

The present disclosure relates to a surgical access device including a cannula body and an anchor. The cannula body includes a housing and an elongated portion extending distally from the housing. The elongated portion defines a longitudinal axis and defines a channel extending there-through. The anchor is disposed in mechanical cooperation with the elongated portion of the cannula body and is longitudinally translatable relative to the elongated portion. The anchor defines an aperture and includes a ratchet mechanism configured to selectively lock a size of the aperture.

In aspects, the ratchet mechanism of the anchor includes a C-shaped clip. The clip may include a first arcuate section and a second arcuate section, where the first arcuate section is movable relative to the second arcuate section.

In aspects, the ratchet mechanism of the anchor includes a clip and a handle, and the handle is pivotable relative to the clip. The ratchet mechanism may include a plurality of teeth disposed on at least one of the first arcuate section of the clip

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or the second arcuate section of the clip. Movement of the first arcuate section relative to the second arcuate section may change the size of the aperture defined by the anchor. The ratchet mechanism may include a plurality of teeth disposed on the handle of the clip configured to engage the plurality of teeth of the at least one of the first arcuate section of the clip or the second arcuate section of the clip. The handle may include a tab configured to facilitate disengagement of the plurality of teeth of the handle from the plurality of teeth of the at least one of the first arcuate section of the clip or the second arcuate section of the clip.

In additional aspects, the anchor may include a sleeve radially surrounding at least a portion of the clip. The sleeve may be made from foam, gel, or rubber.

The present disclosure also relates to an anchor for use with a surgical access device. The anchor defines an aperture and includes a C-shaped clip, and a handle. The C-shaped clip includes a first arcuate section, a second arcuate section and a backspan interconnecting the first arcuate section and the second arcuate section. The first arcuate section is movable relative to the second arcuate section to change a size of the aperture. At least one of the first arcuate section or the second arcuate section includes a plurality of teeth. The handle is pivotably engaged with the first arcuate section of the C-shaped clip. The handle includes a plurality of teeth configured to engage the plurality of teeth of the at least one of the first arcuate section or the second arcuate section of the C-shaped clip to selectively lock a position of the first arcuate section relative to the second arcuate section.

In aspects, the handle may include a tab configured to facilitate disengagement of the plurality of teeth of the handle from the plurality of teeth of the at least one of the first arcuate section of the clip or the second arcuate section of the clip. The anchor may also include a sleeve radially surrounding at least a portion of the C-shaped clip. The sleeve may be made from foam, gel, or rubber.

### DESCRIPTION OF THE DRAWINGS

Various aspects of the present disclosure are illustrated herein with reference to the accompanying drawings, wherein:

FIG. 1 is a perspective view of a surgical access device including an anchor in accordance with the present disclosure;

FIG. 2 is an assembly view of the surgical access device of FIG. 1;

FIGS. 3 and 4 are perspective views of a portion of the anchor of FIGS. 1 and 2;

FIG. 5 is a side view of the surgical access device of FIGS. 1 and 2 within tissue illustrating the anchor in a proximal position;

FIG. 6 is a top cross-sectional view of a portion of the surgical access device taken along section line 6-6 in FIG. 5;

FIG. 7 is a side view of the surgical access device of FIGS. 1 and 2 within tissue illustrating the anchor in a distal position;

FIG. 8 is a top cross-sectional view of a portion of the surgical access device taken along section line 8-8 in FIG. 7;

FIG. 9 is an assembly view of a handle of the anchor according to various aspects; and

FIG. 10 is a perspective of the anchor including the handle of FIG. 9.

### DETAILED DESCRIPTION

Aspects of the presently disclosed surgical access device will now be described in detail with reference to the draw-

ings wherein like numerals designate identical or corresponding elements in each of the several views. As is common in the art, the term “proximal” refers to that part or component closer to the user or operator, i.e. surgeon or physician, while the term “distal” refers to that part or component farther away from the user.

Generally, the surgical access device or cannula, often part of a trocar assembly, may be employed during surgery (e.g., laparoscopic surgery) and may, in various aspects, provide for the sealed access of laparoscopic surgical instruments into an insufflated body cavity, such as the abdominal cavity. The cannula is usable with an obturator insertable therethrough. The cannula and obturator are separate components but are capable of being selectively connected together. For example, the obturator may be inserted into and through the cannula until the handle of the obturator engages, e.g., selectively locks into, a proximal housing of the cannula. In this initial position, the trocar assembly is employed to tunnel through an anatomical structure, e.g., the abdominal wall, either by making a new passage through the structure or by passing through an existing opening through the structure. Once the trocar assembly has tunneled through the anatomical structure, the obturator is removed, leaving the cannula in place in the structure, e.g., in the incision created by the trocar assembly. The proximal housing of the cannula may include seals or valves that prevent the escape of insufflation gases from the body cavity, while also allowing surgical instruments to be inserted into the body cavity.

Additionally, the surgical access device of the present disclosure includes an anchor including a ratchet mechanism configured to engage tissue to help maintain the cannula in its position relative to the body during use.

FIGS. 1-10 illustrate a surgical access device according to the present disclosure. With initial reference to FIG. 1, the surgical access device 10 includes a cannula body 100 and an anchor 200. The cannula body 100 includes a proximal housing 120 at its proximal end, and includes an elongated portion 140 extending distally from the proximal housing 120. The elongated portion 140 defines a channel 150 (FIG. 2) extending therethrough, and defines a longitudinal axis “A-A.” An obturator (not shown) is insertable through the channel 150 and is engageable with the proximal housing 120, for instance.

The anchor 200 is positionable around the elongated portion 140 of the cannula body 100 such that the anchor 200 radially surrounds a portion of the elongated portion 140. More particularly, the anchor 200 is longitudinally translatable along the elongated portion 140 between a first position, where the anchor 200 is farther away from a distal tip 142 of the elongated portion 140 (FIG. 5), and a second position, wherein the anchor 200 is closer to the distal tip 142 of the elongated portion 140 (FIG. 7). Additionally, the anchor 200 is configured to translate longitudinally along the elongated portion 140 of the cannula body 100, and to releasably and selectively lock itself into a desired longitudinal position.

Referring to FIGS. 1 and 2, the engagement between the anchor 200 and the cannula body 100 is shown. The anchor 200 includes a clip 220, a handle 240, and a sleeve 260. The clip 220 of the anchor 200 defines an aperture 222, through which the elongated portion 140 of the cannula body 100 is insertable.

FIGS. 3 and 4 illustrate further details of the clip 220 and the handle 240. The clip 220 includes a first arcuate section 225 and a second arcuate section 235, which together define the aperture 222. In aspects, the clip 220 may be C-shaped including an adjustable gap “G” defined between the first

arcuate section 225 and the second arcuate section 235. The first arcuate section 225 is movable relative to the second arcuate section 235 (or vice versa) between a first orientation defining a first size aperture 222a (FIGS. 3, 4 and 6) and a second orientation defining a second size aperture 222b (FIG. 8). The first size aperture 222a is larger than the second size aperture 222b; the gap “G” corresponding to the first size aperture 222a is larger than the gap “G” corresponding to the second size aperture 222b. In the first orientation, where the clip 220 defines a larger aperture 222a, the anchor 200 is longitudinally translatable along the elongated portion 140 of the cannula body 100. In the second orientation, where the clip 220 defines a smaller aperture 222b, the anchor 200 is fixed from translating longitudinally along the elongated portion 140 of the cannula body 100. As discussed below, a ratchet mechanism 215 is included on the anchor 200 to selectively lock the size of the aperture 222 defined by the anchor 200.

With continued reference to FIGS. 3 and 4, the handle 240 of the anchor 200 is shown. The handle 240 is arcuate, is coupled to a portion of the clip 220, and is pivotable relative to the clip 220. In the aspects shown in FIGS. 2-4, for instance, the handle 240 is integrally formed with the clip 220 (e.g., molded as a part of the clip 220), and includes a living hinge therebetween.

In the aspects shown in FIGS. 9 and 10, for instance, a handle 240' connects to the clip 220 via a pin 243. In the illustrated aspects, the handle 240' is pivotably engaged with the first arcuate section 225 of the clip 220, although the handle may alternatively be engaged with a different portion of the clip 220 (e.g., the second arcuate section 235). As discussed below, pivoting the handle 240' relative to the clip 220 moves the clip 220 between its first orientation and its second orientation.

Referring now to FIGS. 3, 4, 6 and 8, further details of the clip 220 and the handle 240 of the anchor 200 are shown. The first arcuate section 225 and the second arcuate section 235 of the clip 220 each extend from a common backspan 230. The first arcuate section 225 defines a free end 226, which is spaced from the backspan 230, and the second arcuate section 235 defines a free end 236, which is spaced from the backspan 230. Depending on the orientation of the clip 220, a gap “G” is defined between the free end 226 of the first arcuate section 225 and the free end 236 of the second arcuate section 235. As the clip 220 moves from its first orientation to its second orientation, the gap “G” and the aperture 222 defined by the anchor 200 become smaller. In aspects (e.g., depending on the diameter of the elongated portion 140 of the cannula body 100), the free end 226 of the first arcuate section 225 is spaced from the free end 236 of the second arcuate section 235 when the clip 220 is in its second orientation. In other aspects, the free end 226 of the first arcuate section 225 contacts the free end 236 of the second arcuate section 235 when the clip 220 is in its second orientation. In yet other aspects, the free end 226 of the first arcuate section 225 overlaps the free end 236 of the second arcuate section 235 when the clip 220 is in its second orientation.

With continued reference to FIGS. 3, 4, 6 and 8, a ratchet mechanism 215 is shown and is disposed on portions of the clip 220. The ratchet mechanism 215 selectively locks the size of the aperture 222 defined by the anchor 200. The first arcuate section 225 of the clip 220 includes an upper portion 225a and a lower portion 225b, and the second arcuate section 235 of the clip 220 includes an upper portion 235a and a lower portion 235b (FIG. 4). The ratchet mechanism 215 is included on the upper portion 235a of the second

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arcuate section **235** and on the handle **240**. More particularly, the ratchet mechanism **215** includes a plurality of grooves or teeth **238** (i.e., one or more teeth) on the upper portion **235a** of the second arcuate section **235**, and a plurality of grooves or teeth **248** (i.e., one or more teeth) on the handle **240**. The plurality of teeth **238** of the second arcuate section **235** is configured to engage the plurality of teeth **248** of the handle **240** in a ratcheting manner. In particular, the plurality of teeth **238** of the second arcuate section **235** and the plurality of teeth **248** of the handle **240** are angled such that movement of the handle **240** in a first direction (e.g., arrow “B” in FIG. **8**) relative to the second arcuate section **235** is facilitated, while movement of the handle **240** in a second, opposite direction (e.g., arrow “C” in FIG. **8**) relative to the second arcuate section **235** is hindered or prevented. That is, the plurality of teeth **238** of the second arcuate section **235** and the plurality of teeth **248** of the handle **240** are configured to facilitate incremental movement of the clip **220** from its first orientation toward its second orientation, and effectively locks the clip **220** in a desired position (e.g., when the clip **220** is tight around the elongated portion **140** of the cannula body **100**). Additionally, in various aspects, the first arcuate section **225** also includes a plurality of teeth that are configured to engage the plurality of teeth **248** of the handle **240**.

As shown in FIGS. **3**, **4**, **6** and **8-10**, the handle **240** also includes a tab **250** extending radially outwardly from an end of the handle **240**. The tab **250** is configured to be grasped by a user such that manipulation of the handle **240** is facilitated. More particularly, a user can grasp or press the tab **250** of the handle **240** to move (e.g., pivot) the handle **240** relative to the second arcuate section **235** of the clip **220**, such as when moving the clip **220** from its first orientation toward its second orientation. Additionally, a user can move the tab **250** away from the second arcuate section **235** of the clip **220** (in the general direction of arrow “D” in FIG. **6**) to effectively unlock the plurality of teeth **248** of the handle **240** from the plurality of teeth **238** of the second arcuate section **235**.

In various aspects, the tensile strength of the material of the handle **240** helps the handle **240** remain engaged with the second arcuate section **235**. For instance, the handle **240** may be made from plastic or other suitable materials.

As shown in FIGS. **3**, **4**, **6**, **8** and **10**, the clip **220** also includes arms **251**. The arms **251** are shown extending radially outward from a portion of the clip **220** adjacent the backspan **230**. The arms **251** may be useful to grasp while longitudinally translating the anchor **200** along the elongated portion **140** of the cannula body **100**. Additionally, each arm **251** includes a finger **252** at an end thereof, and defines a notch **254**. The fingers **252** and/or notches **254** can be used as locations to tie sutures to during use, for instance. In aspects, the clip **220** may include more or fewer arms **251** than the two arms **251** that are illustrated. For instance, the clip **220** may not include any arms **251**.

The sleeve **260** is shown in FIGS. **1**, **2** and **5-8**. The sleeve **260** radially surrounds the lower portions **225b**, **235b** of the first arcuate portion **225** and the second arcuate portion **235**, respectively, of the clip **220**. In aspects, the sleeve **260** is secured to the clip **220** such that the sleeve **260** and the clip **220** cannot be moved independently of each other. The sleeve **260** is configured to radially expand and contract such that the sleeve **260** remains in contact with the first arcuate portion **225** and the second arcuate portion **235** while the clip **220** transitions between its first and second orientations. Additionally, the sleeve **260** is configured to longitudinally compress in response to being moved against a tissue wall

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“T,” for instance, as indicated by arrows “E” in FIG. **7**. The sleeve **260** may be made from foam, gel, rubber (e.g., elastomers), or other suitable compressive material.

Additionally, as shown in FIGS. **1**, **2**, **5** and **7**, the anchor **200** can be used in connection with an additional fixation mechanism **300**. For instance, as shown in FIGS. **5** and **7**, while the anchor **200** may be positioned along the elongated portion **140** of the cannula body **100** adjacent a proximal wall of tissue adjacent an incision, fixation mechanism **300** can radially extend from the elongated portion **140** of the cannula body **100** and be positioned adjacent a distal wall of the tissue adjacent the incision, for example.

In use, the anchor **200** is initially in a proximal position along the elongated portion **140** of the cannula body **100** as the distal end of the cannula body **100** is being inserted into and/or positioned within the tissue cavity “C” (FIGS. **5** and **7**). Next, the fixation mechanism **300**, if included, is moved to expanded position (FIGS. **5** and **7**), and the cannula body **100** is moved proximally such that the fixation mechanism **300** contacts the distal portion of the tissue wall “T,” for instance. Then, the anchor **200** is moved distally along the elongated portion **140** of the cannula body **100** such that the anchor **200** contacts a proximal portion of the tissue wall “T,” and the ratchet mechanism **215** is utilized to decrease and lock the size of the aperture **222** such that the anchor is fixed positioned on the elongated portion **140** of the cannula body **100**. Here, the tissue wall “T” is sandwiched between the anchor **200** and the fixation mechanism **300** (FIG. **7**), and the longitudinal position of the cannula body **100** is fixed relative to the tissue wall “T.”

While the above description contains many specifics, these specifics should not be construed as limitations on the scope of the present disclosure, but merely as illustrations of various aspects thereof. Therefore, the above description should not be construed as limiting, but merely as exemplifications of various aspects. Those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto.

What is claimed is:

1. A surgical access device, comprising:

a cannula body including a housing and an elongated portion extending distally from the housing, the elongated portion defining a longitudinal axis and defining a channel extending through the elongated portion;

an anchor disposed in mechanical cooperation with the elongated portion of the cannula body and being longitudinally translatable relative to the elongated portion, the anchor defining an aperture and including a ratchet mechanism for selectively locking a size of the aperture; and

a sleeve radially surrounding at least a portion of the anchor.

2. The surgical access device according to claim 1, wherein the ratchet mechanism of the anchor includes a C-shaped clip.

3. The surgical access device according to claim 2, wherein the clip includes a first arcuate section and a second arcuate section, the first arcuate section being movable relative to the second arcuate section.

4. The surgical access device according to claim 2, wherein the sleeve radially surrounds at least a portion of the C-shaped clip.

5. The surgical access device according to claim 1, wherein the ratchet mechanism of the anchor includes a clip and a handle, the handle being pivotable relative to the clip.

6. The surgical access device according to claim 5, wherein the clip includes a first arcuate section and a second

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arcuate section, the first arcuate section being movable relative to the second arcuate section.

7. The surgical access device according to claim 6, wherein the ratchet mechanism includes a plurality of teeth disposed on at least one of the first arcuate section of the clip or the second arcuate section of the clip.

8. The surgical access device according to claim 7, wherein the ratchet mechanism includes a plurality of teeth disposed on the handle of the clip for engaging the plurality of teeth of the at least one of the first arcuate section of the clip or the second arcuate section of the clip.

9. The surgical access device according to claim 8, wherein the handle includes a tab for facilitating disengagement of the plurality of teeth of the handle from the plurality of teeth of the at least one of the first arcuate section of the clip or the second arcuate section of the clip.

10. The surgical access device according to claim 6, wherein movement of the first arcuate section relative to the second arcuate section changes the size of the aperture defined by the anchor.

11. The surgical access device according to claim 5, wherein the sleeve radially surrounds at least a portion of the clip.

12. The surgical access device according to claim 1, wherein the sleeve is made from foam, gel, or rubber.

13. An anchor for use with a surgical access device, the anchor defining an aperture and comprising:

a C-shaped clip including a first arcuate section, a section arcuate section and a backspan interconnecting the first arcuate section and the second arcuate section, the first arcuate section movable relative to the second arcuate section to change a size of the aperture, at least one of the first arcuate section or the second arcuate section including a plurality of teeth; and

a handle pivotably engaged with the first arcuate section of the C-shaped clip, the handle including a plurality of teeth configured to engage the plurality of teeth of the at least one of the first arcuate section or the second

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arcuate section of the C-shaped clip to selectively lock a position of the first arcuate section relative to the second arcuate section.

14. The anchor according to claim 13, wherein the handle includes a tab for facilitating disengagement of the plurality of teeth of the handle from the plurality of teeth of the at least one of the first arcuate section of the clip or the second arcuate section of the clip.

15. The anchor according to claim 13, further including a sleeve radially surrounding at least a portion of the C-shaped clip.

16. The anchor according to claim 15, wherein the sleeve is made from foam, gel, or rubber.

17. A surgical access device, comprising:

a cannula body including a housing and an elongated portion extending distally from the housing, the elongated portion defining a longitudinal axis and defining a channel extending through the elongated portion; and an anchor disposed in mechanical cooperation with the elongated portion of the cannula body and being longitudinally translatable relative to the elongated portion, the anchor defining an aperture and including a ratchet mechanism for selectively locking a size of the aperture, the ratchet mechanism including a clip and a handle, the handle being pivotable relative to the clip, and the clip including a first arcuate section and a second arcuate section, the first arcuate section being movable relative to the second arcuate section.

18. The surgical access device according to claim 17, further including a sleeve radially surrounding at least a portion of the anchor.

19. The surgical access device according to claim 18, wherein the sleeve is made from at least one of foam, gel, or rubber.

20. The surgical access device according to claim 17, wherein the anchor includes a first arcuate section and a second arcuate section, the first arcuate section being movable relative to the second arcuate section.

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